

Learning Scenario 4 - Designing School IT System

Learning Scenario Information	
Title	Designing School IT System
Age Level	13-14 years old
Duration	45 minutes
Informatics topic areas	Computing Systems
Content domain (Integrated Subjects)	Informatics
Learning Objectives	<p>Upon completing this activity, the students should be able to:</p> <ul style="list-style-type: none"> • Identify basic components of a school IT system: computers, software, and network. • Understand how these components work together (to help students and teachers use technology for learning). • Apply their knowledge to design and configure an IT system for a real-world scenario. • Collaborate in teams to analyse, troubleshoot, and make decisions about system design, considering both functionality and efficiency.
Scenario Description	
Setting	<p>Your school has decided to upgrade its IT infrastructure. They need a new system that will meet the needs of students, teachers, and administrative staff.</p> <p>The problem:</p> <p>Currently, the school's computer network is outdated. Students often have trouble accessing online resources due to slow internet, and teachers struggle with unreliable classroom computers. The school wants a new IT system that includes:</p> <ul style="list-style-type: none"> • Hardware: New computers, tablets, and other devices for students and teachers. • Software: Programs that can be used for different subjects, plus a school-wide management system. • Network: A fast, secure internet connection that allows everyone to connect and share resources easily. <p>What should you do?</p> <p>You need to guide your students in creating an IT system design. First, help them understand the different components of a computing system: hardware, software,</p>

	<p>and networks. Then, together with your students, choose the right hardware (computers, tablets, etc.), software programs, and design a network that will work together to meet the school's needs. Make sure that the system is efficient, reliable, and secure.</p>
(Digital) Tools	<ul style="list-style-type: none"> • Internet-connected devices (Computer/Laptop or Tablets) • Projector/ Video platform for .ppt • Papers for brainstorming • Markers
Activity	<p>Activity 1: Understanding IT System Components Duration: 5 minutes</p> <ol style="list-style-type: none"> 1. Start with a short reminder or presentation that defines the three main components of a computing system: hardware, software, and networks. <p>Activity 2 – Designing a Network for the School Duration: 15 minutes</p> <ol style="list-style-type: none"> 1. Students will be divided into teams and asked to design a network for the school. They should consider the number of devices, the required internet speed, and how devices will be connected. 2. Each group will share their proposed design, and the class will discuss the strengths and weaknesses of each approach. The goal is for students to think about scalability, security, and efficiency when designing a network. <p>Activity 3 – Selecting Hardware and Software Duration: 15 minutes</p> <ol style="list-style-type: none"> 1. Provide students with a list of various hardware (e.g., laptops, tablets, projectors, printers) and software (e.g., office suites, subject-specific programs, and management systems) options. Define budget. Students will be asked to consider the needs of students, teachers, and administrative staff and create a proposal for the hardware and software they would select, according to the budget. 2. Teams will present their proposed system and engage in a class discussion about the most effective options. <p>Activity 3 – Troubleshooting and Refining the System Design Duration: 10 minutes</p> <ol style="list-style-type: none"> 1. In this problem-solving session, students will be presented with potential issues in their proposed IT systems, such as network congestion, software compatibility, or hardware limitations. They will work in teams to troubleshoot these problems and propose solutions to make the system more efficient and reliable.

Teachers and students' Roles	<p>Teachers: In this activity, the teacher is a facilitator and guide, providing students with the necessary resources and tools to explore and understand the components of an IT system. The teacher introduces key concepts like hardware, software, and networks, while also helping students navigate the design and troubleshooting processes. They encourage collaboration and critical thinking, ensuring students can effectively apply their knowledge to real-world problems. The teacher also moderates group discussions and presentations, providing feedback on their ideas and designs.</p> <p>Students: Students take on the role of problem-solvers and collaborators. They work in teams to design and develop a functional IT system, researching the needs of the school, selecting appropriate hardware and software, and troubleshooting potential issues. In their teams, students share tasks, such as researching, designing, and presenting, and are expected to apply their critical thinking skills to ensure their solutions are effective, efficient, and user-centred. They will also engage in group discussions and reflection activities, ensuring that the final design is both practical and inclusive.</p>
Evaluation/ Assessment	<p>Evaluation and assessment for this activity can be done through multiple methods to ensure a comprehensive understanding of the students' learning process. First, the teacher can assess students' knowledge of IT system components through quizzes or written reflections to confirm their understanding of hardware, software, and networks. During the group activities, the teacher can observe collaboration and problem-solving skills, evaluate how well students work together and apply their knowledge to design an effective IT system. The final presentation of the IT system design serves as an opportunity to assess their ability to communicate technical concepts and justify their design decisions. Additionally, peer feedback can be incorporated to assess teamwork and to encourage self-reflection on individual contributions. Lastly, the teacher can evaluate the practicality and efficiency of the proposed systems, considering factors like scalability, user-friendliness, and potential troubleshooting solutions.</p>
THINKER Framework Integration	
How is the activity authentic learning?	<p>By simulating the process of upgrading a school's IT infrastructure, students gain practical experience in identifying the components of a computing system, understanding how they work together, and applying this knowledge to create functional solutions. This task requires critical thinking, problem-solving, and collaboration, which are key skills needed in the technology industry. Students must also consider real-world constraints such as budget, security, and user needs, mirroring the challenges faced by IT professionals.</p>
How is gender inclusiveness ensured?	<p>The task is designed so that all students, regardless of gender, can actively participate in the decision-making process and contribute to the design of the IT system. The group activities and collaboration promote equal involvement, allowing each student's voice to be heard. Additionally, the roles assigned in the design process—such as</p>

	hardware, software, and network roles—are not gendered, ensuring that every student can choose a task that matches their interests and skills without any stereotypes. The teacher encourages the formation of diverse teams, ensuring that all students have an equal opportunity to lead and collaborate.
Considerations for level progression	Throughout the process, teachers can assess student progress and adapt the complexity of the activity to meet students at their level, offering more autonomy as their understanding deepens. By the end, students should be able to apply critical thinking and collaborative skills to design and configure a functional IT system.

Learning Scenario 7 - Sustainable city planner

Learning Scenario Information	
Title	Sustainable city planner
Age Level	12-13 years old (7 th – 8 th grade)
Duration	45 minutes
Informatics topic areas	Modelling and Simulation, Design and Development
Content domain (Integrated Subjects)	Geography, Environmental Science, Mathematics
Learning Objectives	<p>Upon completing this activity, the students should be able to:</p> <ul style="list-style-type: none"> • Identify key components of a sustainable city (e.g., green spaces, renewable energy, efficient transport). • Create a basic model of a city using digital tools or physical materials. • Simulate the impact of sustainable planning decisions on energy usage, pollution, and quality of life. • Reflect on how urban planning impacts communities and the environment.
Scenario Description	
Setting	<p>Your town's mayor has asked for your class's help to design a new, sustainable city plan. As "City Planners," students will model and simulate how to design an eco-friendly city by balancing residential, commercial, and natural spaces. They will evaluate the impact of their designs on energy efficiency, pollution, and liveability.</p> <p>Ask students: <i>"What makes a city a great place to live? How can we ensure our cities are eco-friendly?"</i> Challenge them to design a city that balances human needs with environmental conservation.</p>
(Digital) Tools	<ul style="list-style-type: none"> • Plugged: Minecraft Education, SimCity, THINKERcad, or Google Sheets for modelling and simulation. • Unplugged: Grid paper, coloured markers, building blocks, and cut-outs of roads, parks, and buildings.

Activity	<p>Step 1 (10 minutes): Introduction</p> <ul style="list-style-type: none"> • Authentic Context: Discuss what makes cities sustainable, using examples like bicycle lanes, renewable energy, and efficient transportation. • Gender Inclusion: Share stories of diverse urban planners and architects who have designed innovative cities. <p>Steps:</p> <ol style="list-style-type: none"> 1. Ask students, <i>“What problems do big cities face today? How can we solve these problems?”</i> 2. Show examples of sustainable cities (e.g., Copenhagen, Singapore) and highlight key features like solar panels or public transport. <p>Step 2 (15 minutes): City Planning and Design</p> <ul style="list-style-type: none"> • Collaboration: Divide students into small teams and assign each a city-building challenge, such as reducing pollution or maximising green spaces. • Scaffolding: Provide templates or guidelines for city layouts, including required components like homes, schools, and parks. <p>Steps:</p> <ol style="list-style-type: none"> 1. Teams brainstorm and draft a city layout using grid paper or a digital tool. 2. Students assign spaces for residential, commercial, and recreational areas, ensuring their design minimises environmental impact. <p>Step 3 (15 minutes): Simulation and Analysis</p> <ul style="list-style-type: none"> • Plugged Activity: Use tools like SimCity or spreadsheets to simulate energy consumption, traffic patterns, and pollution levels. • Unplugged Activity: Use markers and cut-outs to visualise how resources flow and how decisions affect the city’s sustainability. <p>Steps:</p> <ol style="list-style-type: none"> 1. Teams test their designs through simulations or scenarios, such as adding more green spaces or switching to renewable energy. 2. Analyse outcomes like reduced emissions or improved quality of life. <p>Step 4 (5 minutes): Reflection and Presentation</p> <ul style="list-style-type: none"> • Articulation: Teams present their city plans, explaining how their decisions impact the environment and the community. • Reflection: Encourage peer feedback and group discussion on the strengths and weaknesses of each design. <p>Steps:</p> <ol style="list-style-type: none"> 1. Students describe their planning priorities and the trade-offs they made. 2. Conclude by asking: <i>“What real-life steps can cities take to become more sustainable?”</i>
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Teachers and students' Roles	Teachers: <ul style="list-style-type: none"> • Explain key features of sustainable cities and guide discussions. • Provide tools and templates for designing city models. • Assist with simulations and help students interpret results. • Offer constructive feedback during presentations. Students: <ul style="list-style-type: none"> • Collaborate to design and simulate a sustainable city plan. • Analyse the environmental and societal impact of their decisions. • Present their findings and reflect on how urban planning affects daily life and the planet.
Evaluation/ Assessment	<p>Observe teamwork and creativity during the design phase.</p> <p>Assess city models for balance, sustainability, and innovation.</p> <p>Use presentations and simulations to evaluate understanding of sustainability concepts and trade-offs.</p>
THINKER Framework Integration	
How is the activity authentic learning?	<p>This activity immerses students in the real-world challenge of urban planning. They apply modelling and simulation to test ideas and analyse outcomes, mirroring tasks performed by urban planners. Collaboration encourages teamwork as students design and refine their city plans. Reflection fosters critical thinking, as students evaluate how their choices impact energy, pollution, and liveability.</p>
How is gender inclusiveness ensured?	<p>Highlighting diverse urban planners ensures representation and inspires all students. Collaborative teams with rotated roles promote equal participation, while a mix of digital and physical tools accommodates diverse learning styles. Inclusive activities create a supportive space for all students to engage in designing solutions for sustainable cities.</p>
Considerations for level progression	<p>For beginners: Provide pre-drawn layouts with simple scenarios to modify, such as adding green spaces or public transport.</p> <p>For advanced learners: Challenge students to simulate complex scenarios, such as population growth or energy crises, and analyse their impact on sustainability.</p>

Learning Scenario 8 - Virtual museum of gender and identity

Learning Scenario Information	
Title	Virtual museum of gender and identity
Age Level	12-14 years old
Duration	90 minutes (to be delivered in two sessions)
Informatics topic areas	Digital Creativity, Human-Computer Interaction
Content domain (Integrated Subjects)	Social Studies, Technology, Art
Learning Objectives	<p>Upon completing this activity, the students should be able to:</p> <ul style="list-style-type: none"> • Research and analyse diverse contributions of individuals of different genders across various fields. • Use digital tools to create a virtual exhibit that represents inclusivity and diverse identities. • Develop and present their exhibit to share knowledge on gender and identity in an interactive format.
Scenario Description	
Setting	<p>As a social studies or arts teacher, you want students to explore how people of different genders and identities have contributed to society in fields like science, technology, art, and sports. Through this project, students will create a “virtual museum” with exhibits that represent these diverse figures. They will research notable people, select images, create captions, and design a user-friendly virtual museum. The project will help students think critically about gender representation and learn digital creativity skills. <i>How can you encourage students to create an inclusive and informative digital resource for their peers?</i></p>
(Digital) Tools	<ul style="list-style-type: none"> • Computers or tablets with internet access • Digital tools for creating virtual museums or presentations (e.g., Google Slides, Padlet, Canva, or Wakelet) • Access to online resources for research on historical and contemporary figures

Activity	<p>Step 1 (20 minutes): Introduction to Gender Representation and Research</p> <ul style="list-style-type: none"> ● Kick-off Discussion: Begin with an open discussion where students brainstorm what comes to mind when they think of the terms "gender" and "identity." Highlight that gender is diverse and includes men, women, non-binary people, and individuals of various backgrounds. ● Examples and Inspiration: Share a multimedia presentation featuring individuals from different genders and identities who have contributed significantly to various fields. Examples could include Frida Kahlo (art), Alan Turing (computing), Katherine Johnson (science), Megan Rapinoe (sports), and Marsha P. Johnson (activism). Discuss their achievements and challenges they faced due to gender or identity. ● Project Overview: Explain that students will work together to create a "Virtual Museum of Gender and Identity," researching notable figures and designing interactive digital exhibits. Emphasise inclusivity and creativity in their work. <p>Step 2 (40 minutes): Research and Content Creation</p> <p>Group Organisation: Divide students into small groups or pairs and assign each a specific category, such as science, art, technology, sports, or activism. Each group will select 2-3 figures to research who represent diverse genders and identities.</p> <ul style="list-style-type: none"> ● Guided Research: <ul style="list-style-type: none"> ○ Encourage students to use reliable online resources, such as educational websites or digital encyclopaedias. Teachers can provide a list of suggested figures or platforms to guide students. ○ Students should gather the following for each figure: <ul style="list-style-type: none"> ■ A brief biography ■ Key achievements and contributions ■ Challenges faced due to their gender or identity (if applicable) ■ Visual elements like photos, portraits, or artwork ○ Teach students to use inclusive and respectful language in their captions. <p>Step 3 (20 minutes): Designing the Virtual Museum</p> <ul style="list-style-type: none"> ● Using Digital Tools: Introduce students to tools like Google Slides, Padlet, Canva, or Wakelet. Demonstrate basic features such as adding images, arranging text, and creating interactive elements (e.g., clickable links, embedded videos). ● Building the Exhibit: Each group designs their museum exhibit by: <ul style="list-style-type: none"> ○ Arranging their research findings in an engaging and visually appealing layout.
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	<ul style="list-style-type: none"> ○ Incorporating captions and labels that highlight the significance of each figure's contributions. ○ Adding interactive elements, such as clickable "Did You Know?" sections or multimedia components (e.g., video clips, audio snippets). ● Focus on Inclusivity: Encourage groups to ensure their designs and narratives are accessible and inclusive, considering readability and visual clarity for diverse audiences. <p>Step 4 (10 minutes): Presentation and reflection</p> <ul style="list-style-type: none"> ● Group Presentations: Each group presents their virtual exhibit to the class. They explain their design choices, highlight key insights from their research, and discuss what they learned about the contributions of individuals from various genders and identities. ● Class Feedback: Allow time for classmates and teachers to ask questions or provide constructive feedback. This can include suggestions on enhancing inclusivity or interactivity. ● Reflection: Conclude with a brief discussion on the importance of representation and how recognising diverse identities helps foster inclusivity in society.
Teachers and students' Roles	<p>Teachers:</p> <ul style="list-style-type: none"> - Facilitate discussions and guide students in understanding the significance of gender and identity in society. - Support students in conducting research and using digital tools effectively. - Monitor group progress to ensure respectful and accurate representation of all figures. <p>Students:</p> <ul style="list-style-type: none"> - Collaborate in groups to research and design their exhibits. - Practise critical thinking by analysing how the achievements of individuals are influenced by their identity and context. <p>Take responsibility for ensuring their exhibits are informative, inclusive, and engaging.</p>

Evaluation/ Assessment	<ul style="list-style-type: none"> • Research quality: Inclusivity and accuracy of content, ensuring diverse gender representation and respectful language. • Exhibit design: Creativity, clarity, and inclusivity of the visual presentation, enhancing the viewer's understanding of the exhibit. • Presentation: Engagement and ability to clearly articulate ideas about gender inclusivity and identity, demonstrating a deep understanding of the topic. • Participation: Collaboration and contribution during group work, ensuring equal involvement and effective teamwork.
THINKER Framework Integration	
How is the activity authentic learning?	<p>The "Virtual Museum of Gender and Identity" activity is authentic learning because it connects students to real-world issues of gender representation and identity in society. By creating a digital museum exhibit, students are simulating the work of museum curators, artists, and historians, applying interdisciplinary knowledge in a meaningful context. They conduct research to understand diverse gender identities and their contributions to various fields, which directly reflects real-world curatorial and educational practices. This project not only requires students to think critically about gender but also equips them with digital literacy skills as they design interactive and visually engaging exhibits. The task fosters civic awareness and empowers students to create educational content that promotes inclusivity, making it a relevant and authentic learning experience.</p>
How is gender inclusiveness ensured?	<p>Gender inclusiveness is ensured throughout the "Virtual Museum of Gender and Identity" activity by focusing on the representation of diverse gender identities and fostering equitable participation among all students. The project encourages students to explore a broad spectrum of gender experiences, including non-binary, transgender, and gender-fluid identities, alongside traditional male and female figures. By assigning roles such as researcher, designer, and presenter without reinforcing gender stereotypes, the activity ensures equal involvement for all students, regardless of their gender. The content students research and present is centred on individuals who have contributed to society while challenging gender norms, further emphasising inclusivity. This approach not only raises awareness of gender diversity but also promotes a classroom environment where all students can participate equally and learn about the importance of inclusive representation.</p>
Considerations for level progression	<ul style="list-style-type: none"> • Beginner Level: Provide a list of suggested figures for research and pre-made templates for the virtual exhibit to simplify the design process.

- **Advanced Level:** Challenge students to include multimedia elements (e.g., video clips, audio recordings) and ask them to add more context about how societal attitudes toward gender and identity have evolved over time.

Learning Scenario 1 - App the gap

Learning Scenario Information	
Title	App the gap
Age Level	12-14 years old
Duration	45 minutes
Informatics topic areas	Design and Development, Programming
Content domain (Integrated Subjects)	Informatics
Learning Objectives	<p>Upon completing this activity, the students should be able to:</p> <ul style="list-style-type: none"> • Develop technical skills: Understand the basics of app development. • Promote ethical awareness: Explore how technology reflects and shapes social values. • Foster problem-solving: Identify and address real-world issues. • Encourage creativity and teamwork: Work collaboratively to design innovative solutions. • Apply user-centred design principles to app development.
Scenario Description	
Setting	You are excited to inspire students to become ethical app developers by engaging them in authentic problem-solving activities that align with social values. Through collaboration and hands-on development, they will learn to integrate social values into their design while solving real-world problems.
(Digital) Tools	<ul style="list-style-type: none"> • Computers/laptops • Thunkable or MIT App Inventor • Internet access
Activity	<p>Step 1 (10 minutes): Introduction and Discussion on Socially Impactful Apps</p> <ul style="list-style-type: none"> • Introduction: Begin with a discussion about how apps can positively influence society. Show examples of impactful apps such as: Calm (meditation), Woebot (mental health chatbot), Too Good To Go (food waste reduction), EcoBuddy (tracking sustainable habits). Or even Khan Academy (learning resources), Duolingo (language learning). • Stimulate the discussion by giving your student some questions like: What makes an app socially impactful? How do these apps promote values like inclusivity, accessibility, or sustainability? • Introduce the concept of ethical design—how apps must consider user

	<p>privacy, cultural respect, and accessibility - You can start watching this video</p> <p>Step 2 (10 minutes): Problem Identification and Brainstorming</p> <ul style="list-style-type: none"> • Split your students in teams of 3–4. • Choose a Social Issue: Teams select an issue relevant to their community or interests (e.g., promoting mental health in teens, increasing recycling rates, helping students with learning difficulties). • Guided Brainstorming: Each team defines: Target audience: Who will use this app? - Core features: What will the app do to address the issue? - Social values: What values (e.g., inclusivity, sustainability) will the app promote? Encourage students to consider diverse user perspectives, ensuring their app serves a broad audience. <p>Step 3 (15 minutes): App Prototyping</p> <ul style="list-style-type: none"> • Introduction to Development Tools: Provide your students with: a) a brief tutorial on platforms like Thunkable or MIT App Inventor (you can find some good examples online) and b) how to create interactive elements (e.g., buttons, forms, animations). • Activity - Building a Prototype: Teams develop a simple, functional prototype of their app. Each app should include key features like gamification, information sharing, or user engagement. This phase should encourage iterative design—test and refine ideas during development. <p>Step 4 (10 minutes): App Presentation and Reflection</p> <ul style="list-style-type: none"> • Each team presents their app prototype to the class. Presentations should include: a) The problem the app addresses, b) Key features and how they align with the social issue, c) Ethical considerations integrated into the design. • Reflection Questions to stimulate the discussion: How does your app reflect social values and promote positive behaviour? What challenges did you face, and how did you overcome them? What ethical considerations guided your choices? Include reflection prompts, such as: Does your app consider the needs of users of all genders? Or How does your app promote inclusivity?
<p>Teachers and students' Roles</p>	<p>Teacher: Prepare the materials for students. Provide technical assistance and feedback as needed. Stimulate the discussion with some questions.</p> <p>Students: They act as socially-conscious innovators, identifying community challenges, brainstorming creative solutions, and collaboratively designing app prototypes that integrate ethical and inclusive values.</p>

Evaluation/ Assessment	<p>Some elements can be used for the assessment:</p> <ul style="list-style-type: none"> • Innovation and Relevance: Does the app idea creatively address the chosen issue? • Technical Progress: Is the prototype functional and user-friendly? • Ethical Integration: Are social values thoughtfully incorporated into the design? • Collaboration and Presentation: Did the team work effectively and communicate their ideas clearly?
THINKER Framework Integration	
How is the activity authentic learning?	This scenario fosters authentic learning by connecting classroom activities with real-world challenges, inspiring students to see themselves as agents of positive change in their communities.
How is gender inclusiveness ensured?	The scenario can be considered gender inclusive by ensuring that all students, regardless of their gender identity, feel represented, valued, and empowered throughout the activity. In Particular, they can use inclusive language. Additionally, teachers can present examples of apps created by diverse developers, including women and non-binary individuals, to demonstrate that app development is a field for everyone. For example: Girls Who Code or GoldieBlox, a STEM-focused app and brand for girls.
Considerations for level progression	<p>Community Feedback: Share prototypes with peers, teachers, or community members for feedback.</p> <p>Further Development: Encourage students to refine their apps based on feedback and potentially publish them.</p>